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GOVERNANCE, HEALTH, AND WELL-BEING IN SMALL-SCALE FISHERIES: AN INTERACTIVE PERSPECTIVE ON OCCUPATIONAL HEALTH SYSTEMS

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Abstract

Small-scale fisheries (SSF) are among the most hazardous occupational sectors globally, exposing fishers to multiple risks ranging from musculoskeletal disorders and physical injuries to mental health challenges and economic insecurity. These risks are not merely biological or technical phenomena; they are shaped by how societies govern human well-being within fisheries systems. This article employs Interactive Governance (IG) theory to analyze how governance dynamics influence the governability of occupational health in SSF. Rather than a comparative analysis, the discussion positions Norway and Malawi along a governance spectrum that reveals how resources, institutional capacity, and participatory structures interact to shape occupational health outcomes. Norway represents a resource-enabling governance environment with structured institutions and advanced welfare mechanisms, while Malawi embodies a participatory but resource-constrained governance system. Drawing from theoretical literature and empirical studies, including Thorvaldsen et al. (2022), Ruud and Friis (2021), Holm et al. (2021), and Kalumbi et al. (2020), the sources direct the examination about how the interplay of resources, participation, and reflexivity determines the governability of occupational health and well-being in SSF. Findings indicate that both governance systems face limitations: Norway's institutional complexity risks policy fragmentation, while Malawi's participatory model struggles with infrastructural and institutional inadequacies. The paper concludes that improving occupational health and well-being in SSF requires adaptive, hybrid governance approaches that integrate participatory engagement with resource-enabled structures to enhance overall governability and sustainability. Ultimately, governability depends not solely on resources but on the adaptability, inclusivity, and reflexivity of governance systems that sustain both human well-being and fisheries resilience.

Keywords: Governability, governance spectrum, interactive governance, occupational health, small-scale fisheries, Malawi, Norway, well-being

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Introduction

Fishing is globally recognized as one of the most hazardous occupations (International Labour Organization [ILO], 1999; Roberts, 2010; Thorvaldsen, 2017, 2015; Øren et al., 2019). According to Thorvaldsen (2015), "Globally, it is estimated that 24,000 deaths each year are caused by fishing." The physical, ergonomic, and psychological risks inherent in the sector are intensified in small-scale fisheries (SSF), where fishers often work under demanding conditions that expose them to multiple health and safety hazards (Ngaruiya et al., 2019; Sandsund et al., 2019). In this article, SSF are understood as diverse, labor-intensive fishing activities that are typically characterized by relatively small-scale operations, close connections to local communities, and varying degrees of formalization—recognizing that their specific features, technologies, and institutional embeddedness differ substantially across countries and fisheries systems. Musculoskeletal disorders (MSDs), fatigue, injuries, and exposure to extreme weather are common, while psychosocial pressures related to economic insecurity, isolation, and market volatility exacerbate vulnerability (Utete, 2023; King et al., 2021; Woodhead et al., 2018). These vulnerabilities, however, manifest differently across governance contexts, depending on, among others, institutional capacity, resource availability, and regulatory reach. In many low- and middle-income countries, SSF operate informally, with limited access to health infrastructure and social protection systems. In contrast, countries such as Norway, though highly developed, still face challenges in occupational health within fisheries due to the sector's inherent risks and late implementation of industry-specific safety regulations. The Norwegian welfare state ensures universal healthcare access and comprehensive social security coverage for all residents, including fishers (Ruud & Friis, 2021). Formal occupational health and safety frameworks, while now well established, were adopted relatively late in the fishing industry, which historically suffered from high injury rates and lagged behind other sectors in regulatory oversight (Thorvaldsen et al., 2022). Today, fishers continue to face high accident rates and difficult working conditions shaped by both environmental factors and changing economic pressures such as quota systems and vessel consolidation (Holmen et al., 2025). In contrast, in countries like Malawi, fishers' vulnerabilities are tied to structural resource limitations and weak institutional capacity. Fishing communities often lack nearby health facilities, social insurance coverage, and adequate safety training. Mobility among fishers—driven by seasonal variations in catch availability—creates additional governance challenges, undermining stable access to healthcare and consistent enforcement of safety standards (Holm et al., 2021; World Health Organization [WHO], 2013). Thus, while both Norway and Malawi face occupational health challenges, the nature and origins of these challenges differ sharply, reflecting variations in governance capacity, institutional reach, and socio-economic context. Taken together, these contrasting experiences indicate that occupational health in SSF cannot be understood solely through epidemiological or clinical frameworks. It is fundamentally a governance issue—a "wicked" problem requiring collective, adaptive, and multi-level responses (Jentoft & Chuenpagdee, 2015). Health outcomes are shaped by how institutions, actors, and power relations interact across scales, from individual behavior and community norms to state regulations and global market forces. Governance structures determine how risks are distributed, responsibilities shared, and accountability maintained across fisheries systems. Recent studies illustrate that fishers' health and safety outcomes are closely linked to governance arrangements. Thorvaldsen et al. (2022) show that in Norway, fisheries management regimes and quota-based regulations affect work intensity and fatigue, indirectly influencing safety and mental health. Similarly, Holm et al. (2021) highlight how in Malawi, mobility, poverty, and lack of coordination between fisheries and health authorities create systemic vulnerabilities. These cases demonstrate that health risks emerge not only from individual behavior but also from the governance configurations that regulate fishing activity and well-being. This article adopts Interactive Governance (IG) theory as a framework for

understanding how occupational health and safety (OHS) challenges in SSF are governed. IG theory conceptualizes governance as a dynamic process of interaction among actors, institutions, and systems at multiple levels (Kooiman, 2003; Jentoft & Chuenpagdee, 2015). It emphasizes that the governability of a system—the capacity to manage it effectively—depends on the complexity of the system-to-be-governed, the capacity of the governing system, and the quality of their interactions (Kooiman & Bavinck, 2013). Rather than offering a direct empirical comparison, the article uses Norway and Malawi as analytically contrasting examples positioned at opposite ends of a governance spectrum. This illustrative approach serves to highlight how variations in resources, institutional arrangements, and participatory capacity shape the governability of occupational health systems in SSF. Norway represents a resource-enabling but institutionally complex system with strong welfare mechanisms but persistent coordination challenges, whereas Malawi exemplifies a participatory but resource-constrained governance setting.

The aim of this study is not to compare these countries directly but to use them as conceptual anchors for exploring how governance diversity shapes opportunities for improving health and well-being among small-scale fishers. By framing occupational health as a governance issue, this article seeks to: (1) demonstrate how Interactive Governance theory illuminates systemic barriers and opportunities in OHS governance for SSF; (2) explore how resource capacity and participatory dynamics interact across contexts; and (3) identify strategies to enhance the governability of occupational health systems through more integrated, reflexive, and inclusive governance arrangements. By conceptualizing occupational health as a governance issue, the article contributes to an emerging interdisciplinary discourse linking fisheries management, public health, and social policy. It argues that improving fishers' well-being depends not only on technological innovation or medical outreach but on the interactive governance capacity of societies to align institutions, resources, and participation in managing complex socio-ecological systems.

Theoretical Framework: Interactive Governance Theory

Conceptual Foundations

Interactive Governance (IG), as developed by Kooiman (2003) and further elaborated by Jentoft and Chuenpagdee (2015), provides a comprehensive framework for analyzing how diverse actors, institutions, and systems interact to address complex societal challenges. IG conceptualizes governance not as a static arrangement of authority but as an ongoing process of interaction among multiple entities with varying capacities, values, and objectives. Governance outcomes, therefore, emerge from the dynamic interplay of three key components: the governing system, the system-to-be-governed, and the interactions that link the two (Kooiman et al., 2005).

The governing system comprises the actors, institutions, and instruments responsible for steering societal processes—ranging from ministries, health authorities, and local governments to fisher associations and community organisations. The system-to-be-governed includes the ecological, economic, and social dimensions of fisheries, encompassing marine ecosystems, fishing communities, and their livelihood systems. The interactions between these two domains—manifested through communication, negotiation, cooperation, and even conflict—determine the effectiveness of governance, or what IG terms governability (Kooiman & Bavinck, 2013).

Governability refers to a system's overall capacity to be governed effectively, contingent on its complexity, diversity, and dynamics. When governing capacities are well-matched to the complexity of the system-to-be-governed, governance processes tend to be stable and adaptive. However, when complexity exceeds capacity—as is often the case in small-scale fisheries—governance gaps and social inequities emerge (Kooiman, 2003). Under such conditions, Kooiman and Bavinck (2005) emphasize that governance must be "structured, open, and flexible," capable of responding to uncertainty and change through reflexive and inclusive mechanisms.

Applied to small-scale fisheries (SSF), IG theory underscores that the well-being and occupational health of fishers cannot be isolated from the broader social-ecological systems they inhabit. Fishers' health outcomes are shaped not only by individual behavior or occupational hazards but also by the quality of institutional relationships, policy coordination, and participatory engagement that define the governance environment. Occupational health, in this sense, is both a governance product and a governance indicator: it reflects how effectively institutions integrate human well-being into their regulatory and policy frameworks.

Core Concepts and Structural Dimensions

Interactive Governance, as schematically depicted by Kooiman et al. (2005), is built around the recursive interactions of governing systems, systems-to-be-governed, and their interfaces. The governing system exerts influence through rulemaking, policy design, and implementation, while the system-to-be-governed—comprising communities, resource users, and ecosystems—responds, adapts, or resists based on its internal diversity and power dynamics. The space between them—the interactive domain—is where governance truly happens; where actors negotiate meanings, exchange knowledge, and shape outcomes through collaboration or contestation.

In the context of SSF, this interactive domain encompasses multiple scales: the individual (self-regulation and safety behavior), the community (collective organization and co-management), and the institutional (policy, regulation, and service delivery). Health outcomes in fisheries thus, mirror the strength and quality of these multi-scalar interactions. When actors communicate effectively, align incentives, and share information, governance tends to enhance well-being. Conversely, when power imbalances or fragmentation prevail—as seen in both the Norwegian and Malawian contexts—occupational health suffers despite policy intent.

IG further emphasizes that governance systems are multi-dimensional, operating through modes and orders that shape how interactions occur and evolve over time.

Modes of Governance

Kooiman et al. (2005) identifies three primary modes of coordination that structure governance interactions: hierarchical, self-governance, and co-governance.
In hierarchical governance, authority is centralized—rules, standards, and enforcement flow from state institutions or regulatory bodies. This mode is evident in Norway's fisheries management and occupational safety regulations, where ministries and directorates prescribe safety protocols and monitor compliance (Thorvaldsen et al., 2022).

Self-governance refers to contexts where actors, such as fishers and local associations, take collective responsibility for managing their own activities—often outside or alongside formal government oversight. Examples include fishers' informal safety norms, mutual aid practices, or voluntary insurance arrangements.

Co-governance, finally, represents a hybrid mode where governance responsibilities are shared between state and non-state actors, as in Malawi's Beach Village Committees (BVCs) (USAID, 2020). These participatory mechanisms foster local ownership and legitimacy, though their effectiveness depends on the resource and institutional support they receive.

Most real governance systems combine all three modes in varying proportions. Their balance influences how adaptable and resilient a governance arrangement becomes, especially under stress. Hierarchical structures provide stability and clarity but may limit participation; self-governance fosters autonomy but can lack scale and consistency; co-governance offers collaboration but requires trust and coordination.

Orders of Governance and Reflexivity

IG theory also distinguishes between different orders of governance—levels at which decisions and reflections occur (Kooiman et al., 2005; Jentoft & Chuenpagdee, 2015). These include first-order, second-order, and third-order (meta-) governance.

First-order governance pertains to everyday management and operational problem-solving, such as enforcing vessel safety, conducting inspections, or treating injuries. It focuses on direct, practical actions.

Second-order governance concerns the design and maintenance of the institutional frameworks that enable first-order activities—such as establishing occupational health programs, insurance schemes, and service delivery structures.

Third-order governance, or meta-governance, operates at the reflective level of values, principles, and collective goals. It addresses normative questions: What are we governing for? Which values—efficiency, safety, sustainability, or equity—should guide our decisions?

Effective governance of occupational health in fisheries depends on the interplay of all three orders. Regulations and daily enforcement (first-order) are insufficient without supportive institutions (second-order) and without shared social values that prioritize dignity, safety, and sustainability (third-order). In Norway, for instance, occupational health regulations and formal institutions are well developed, yet systemic fragmentation challenges meta-governance coherence (Ruud & Friis, 2021; Thorvaldsen et al., 2022). In Malawi, participatory governance demonstrates strong community engagement (meta-governance ideals), but weak institutional capacity undermines implementation at the operational level (Holm et al., 2021).

Integrating IG Across the Governance Spectrum

This theoretical scaffolding provides a lens for analyzing occupational health governance along the Malawi–Norway spectrum. It enables us to see governance not as a binary of strong versus weak, but as a continuum of interaction, capacity, and reflexivity. Norway exemplifies a hierarchical and second-order dominant system: resource-enabling, institutionally mature, but prone to rigidity and specialization. Malawi, conversely, illustrates a co-governance and meta-order-oriented system: participatory and normatively inclusive, yet lacking material capacity and structural reinforcement.

Figure 1 synthesizes core elements of Interactive Governance (IG) by situating governing modes and orders of governance along a continuum from participatory, resource-constrained contexts (Malawi) to resource-enabling, complex systems (Norway). It shows how self-, co-,

and hierarchical governance interact across first-order (operational), second-order (institutional), and third-order (meta-governance) levels to shape occupational health and well-being outcomes. The figure highlights contrasting constraints and capacities: in Malawi, strong participation and legitimacy are offset by limited institutional resources, while in Norway, robust regulation and welfare provision are challenged by coordination gaps and system fragmentation. Governability is thus conceptualized as a function of the balance between participation, institutional capacity, and reflexive coordination across governance orders.

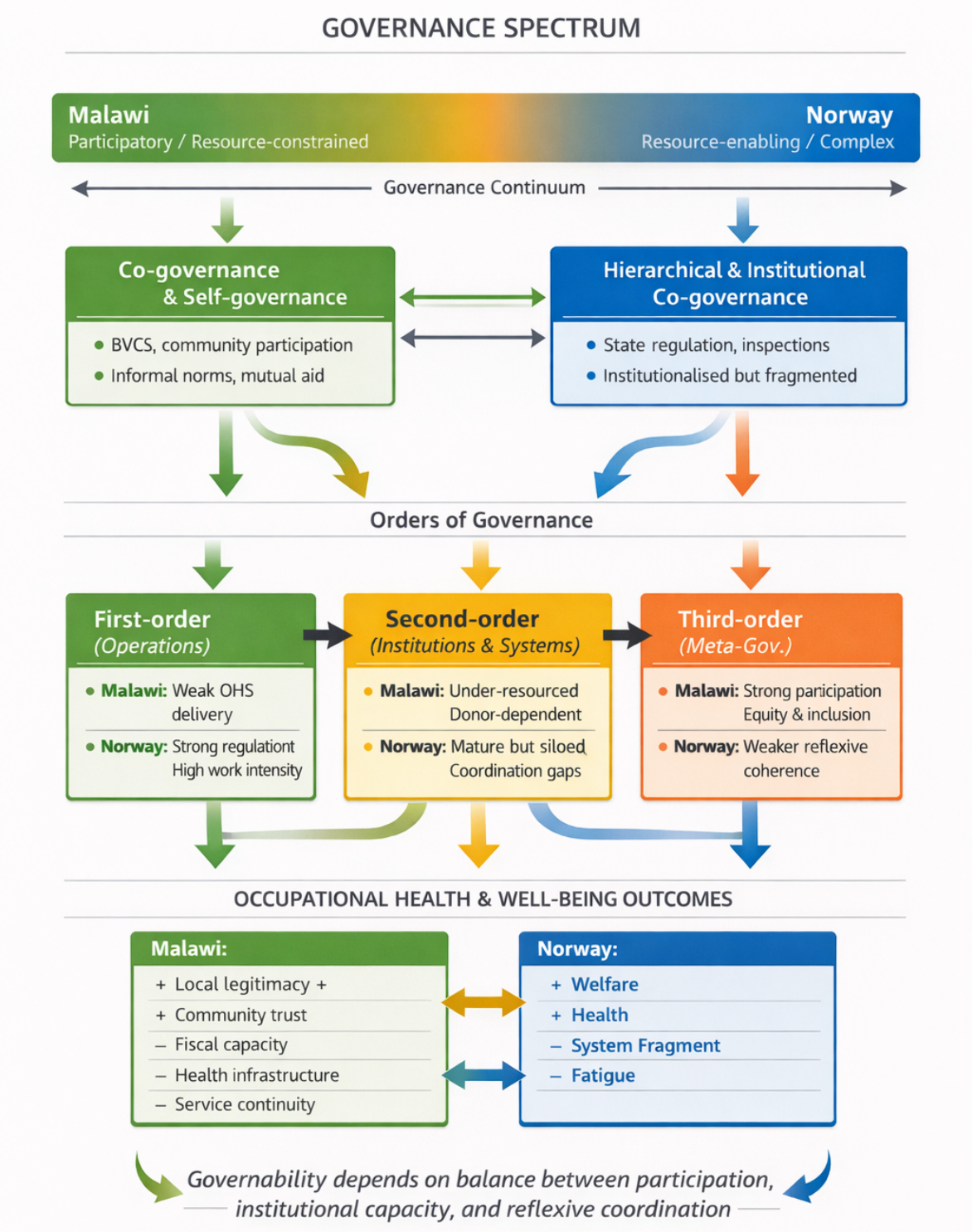

Figure 1. Integrated interactive governance framework across the Malawi–Norway spectrum

By applying IG theory in this way, the article treats occupational health as a governance phenomenon rather than a sectoral policy domain. It demonstrates that improving health and well-being in SSF requires balancing governance modes and orders—ensuring that first-order safety measures are supported by second-order institutions and guided by third-order values of justice and inclusion. In doing so, IG provides a robust analytical foundation for interpreting how governance interactions shape health outcomes across divergent socio-political contexts.

Methodological Orientation

This article adopts a conceptual and interpretive methodology, combining theoretical exposition with empirical illustration. The study applies the framework of Interactive Governance (IG) theory (Jentoft & Chuenpagdee, 2015) to analyze how governance structures, institutional capacity, and actor interactions influence occupational health and well-being in small-scale fisheries (SSF). Rather than seeking to measure outcomes quantitatively, the research emphasizes interpretive depth—illustrating how variations in structure, participation, coordination, and reflexivity shape the governability of health systems along the exemplified Norway–Malawi spectrum.

The analysis draws on a structured synthesis of secondary and documentary sources. Relevant literature and policy documents were identified through targeted searches in academic databases (Web of Science, Scopus, and Google Scholar) and institutional portals (FAO, WHO, ILO, European Parliament, Norwegian Directorate of Health, and USAID). Search terms combined governance- and health-related keywords (e.g. *interactive governance*, *occupational health*, *fisheries*, *small-scale fisheries*, *safety at sea*, *Malawi*, *Norway*). The review focused on English-language sources published primarily between 2010 and 2025, including peer-reviewed articles, policy reports, and authoritative institutional publications. Sources were included based on their relevance to occupational health, fisheries governance, or institutional arrangements in SSF, while documents lacking empirical grounding or clear analytical relevance were excluded.

Key sources include the *Safety and Working Conditions in the Fisheries Sector* (FAO Secretariat, 2024), Thorvaldsen et al. (2022) on Impact of fisheries management on fishers' health and safety, Ruud and Friis (2021) on *Community-based mental health services in Norway,* and *Holm et al.* (2021) on occupational mobility and health vulnerabilities in Malawi's Lake Malawi fishery, Kalumbi et al. (2020) on Water, Sanitation, and Hygiene from a Fishing Community in Malawi, and more so, the *Norwegian Directorate of Health* (Helsedirektoratet, 2021) sectoral public health report. Additional material was derived from institutional and technical reports, such as the *European Parliament Study on Health and Safety in Fisheries* (Voces & Spera – European Parliament, 2017; Voces - European Parliament, 2017), the *Proceedings of IFISH-6 Conference* (Lincoln et. al, 2024). Complementary governance and participatory perspectives were incorporated from *USAID Mikajy Activity (2020) and* Kachilonda et al. (2024) *Beach Village Committee Assessment Report (REFRESH Program)*. By combining such sources, the study captures diverse governance environments and draws theoretical insights from existing empirical knowledge rather than new field data.

Norway and Malawi were selected as analytically contrasting cases rather than as representative or exhaustive examples. They serve as *illustrative poles*—ideal-typical anchors along a governance spectrum—rather than as cases in a systematic comparative analysis. Norway exemplifies a resource-enabling, institutionally mature, and hierarchically coordinated governance context, whereas Malawi illustrates a participatory, resource-constrained setting in which co-governance and community engagement play a central role. These cases do not

represent all fisheries governance systems, nor are they intended for direct comparison or generalization; instead, they provide bounded illustrations for exploring how differing configurations of capacity, participation, and institutional coordination shape governability in SSF.

The synthesis was guided by the IG analytical process (Jentoft & Chuenpagdee, 2015) and followed three interpretive steps: (1) identifying the range and diversity of actors and structures involved in occupational health governance; (2) analyzing the nature and quality of interactions among governing institutions, health systems, and fishers; and (3) assessing the implications of these interactions for the overall governability of occupational health and well-being. By situating occupational health within broader governance relations, the methodology provides a transparent and theoretically grounded basis for examining how governance diversity influences the capacity to sustain health and safety outcomes in SSF across contrasting socio-political contexts.

Occupational Health and Well-being as a Governance Issue

Occupational health and well-being within small-scale fisheries must be understood not merely as a technical or medical concern but as an intrinsically governance-related issue. Fishing is consistently ranked among the world's most hazardous occupations, with fatality rates exceeding those in agriculture, forestry, and construction combined (Lincoln, 2024; FAO Secretariat, 2024; Thorvaldsen et al., 2022; McGuinness et al., 2013; ILO, 1999). These risks persist even within highly regulated contexts such as Norway and are magnified in resource-limited environments such as Malawi, where institutional and infrastructural deficits exacerbate vulnerabilities (Holm et al., 2021). The interactive governance perspective underscores that improving fisher health and safety depends on the coordination among institutions, actors, and policies across local, national, and international levels (Jentoft & Chuenpagdee, 2015; Kooiman et al., 2005).

The Governance Character of Occupational Health

As emphasized by the Food and Agriculture Organization (FAO), the International Labour Organization (ILO), and the International Maritime Organization (IMO) at the Sixth International Fishing Industry Safety and Health Conference (IFISH 6), the majority of accidents and fatalities occur in small-scale fisheries, where weak enforcement of safety regulations, lack of training, and informal employment conditions predominate (Lincoln, 2024; FAO Secretariat, 2024). The FAO Committee on Fisheries (COFI) in 2022 further called for enhanced data collection on fisher safety and the integration of occupational safety within broader fisheries management frameworks—an acknowledgment that health, safety, and sustainability are inseparable (FAO, 2022). Thus, occupational health in fisheries represents what governance scholars describe as a "wicked problem"—multi-causal, persistent, and requiring multi-scalar coordination (Kooiman, 2003; Msomphora & Jentoft, 2024).

In Europe, initiatives such as the SAFEFISHING project—endorsed by the European Parliament and developed by Europêche and partner institutions—demonstrate how training and risk-prevention programs can institutionalize safety culture through digital learning and standardized protocols (Voces - European Parliament, 2017). The project's emphasis on harmonized vocational training in line with the International Maritime Organization's Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F Convention) provides a governance model for aligning occupational safety with international maritime standards. Although developed for trawling sectors, its principles—structured certification, participatory risk prevention, and collaborative monitoring—illustrate

transferable lessons for small-scale fisheries globally, including Norway's coastal fleet and Malawi's artisanal fishers.

Resource-Enabling Governance: The Norwegian Example

Norway's fisheries sector exemplifies a resource-enabling governance system in which statutory frameworks, collective agreements, and welfare institutions embed occupational health as a social right. According to Nofima's *Social Sustainability in the Norwegian Fisheries Industry* report (2021), Norway's Working Environment Act, Human Rights Act, and adherence to ILO Convention No. 188 jointly guarantee minimum standards for health, safety, and environment (HSE) in fisheries. The *SocSus* (social sustainability) project highlights how national law and EEA regulations collectively enforce compliance through inspection, reporting, and sanction mechanisms (Nofima, 2021). However, even within this robust regulatory environment, small-scale fishers remain disproportionately exposed to risk. Thorvaldsen et al. (2022) observed that musculoskeletal disorders (MSDs), vessel instability, and exposure to cold stress remain endemic, especially among crews on vessels under 11 meters. These findings correspond with hospitalization data showing that fishers experience more frequent and prolonged injury-related admissions than workers in any other Norwegian occupational group. The persistence of these issues points to governance fragmentation—occupational safety is administratively separate from fisheries management—resulting in policy silos that limit systemic prevention. Furthermore, the majority of the total fishers' fatalities in Norway involved fishers in the small coastal fleet (SSF), often working alone (Thorvaldsen, 2015).

Despite Norway's strong welfare infrastructure and universal access to health services, there is currently no specialized occupational health program dedicated to fishers as a professional group. Existing health initiatives, such as municipal physiotherapy schemes or the *Frisklivssentralen* lifestyle centers, are open to the general population but not tailored to the specific ergonomic, psychological, or environmental challenges faced by small-scale fishers (Ruud & Friis, 2021). In contrast, Norway's aquaculture industry benefits from an extensive and specialized fish health monitoring system, coordinated by the Norwegian Veterinary Institute, which oversees the prevention, detection, and control of diseases among farmed fish (Norwegian Veterinary Institute, 2025; Geminni.no, 2025). This system exemplifies a coordinated, data-driven, and preventive governance approach: it integrates monitoring, early-warning mechanisms, and regulatory collaboration between industry, research institutions, and state authorities.

From an Interactive Governance perspective, this contrast highlights an important asymmetry in how health is governed within the broader fisheries sector. The fish in aquaculture are systematically monitored for biological stress and disease, but the people who harvest and manage marine resources lack a similarly structured occupational health framework. The Norwegian government—specifically the Helsedirektoratet (Norwegian Directorate of Health) in collaboration with public health research institutions—could therefore draw inspiration from the aquaculture model to establish a Fishers' Health and Well-being Program focused on prevention, early intervention, and longitudinal health monitoring for those working in capture fisheries. Such a program could integrate ergonomic assessments, mental health screening, and musculoskeletal rehabilitation within a national occupational surveillance system. By embedding this within fisheries governance, Norway could significantly enhance the governability of its occupational health system, aligning with IG theory's principle of creating co-evolving, interactive relationships among health authorities, fisheries institutions, and fisher communities. This would also strengthen reflexive learning within governance—transforming

data on fisher health into adaptive policy responses that promote both human well-being and social sustainability in Norwegian fisheries.

Participatory Governance Under Constraint: The Malawi Example

At the opposite end of the governance spectrum lies Malawi, where small-scale fishers (SSFs) around, e.g., Lake Malawi and Lake Malombe operate under acute resource and institutional limitations. The governance and occupational health conditions of these fishing communities reveal the compounded effects of poverty, infrastructural deficits, and weak institutional capacity on fishers' well-being. As Holm et al. (2021) show, occupational mobility is a defining feature of Malawian SSFs: fishers migrate seasonally in pursuit of declining fish stocks, often crossing district boundaries and undermining the stability of community-based governance structures. Vessels are frequently unregistered, lacking flotation devices, radio communication, or life jackets—conditions that expose fishers to drowning, fatigue, and preventable accidents. The governance of safety and occupational health depends largely on Beach Village Committees (BVCs), local institutions designed under Malawi's Participatory Fisheries Management (PFM) framework to co-manage fishery resources with district and national authorities (Kachilonda et al., 2020). Yet, despite their participatory intent, these committees function under severe resource constraints. Their effectiveness is constrained by insufficient funding, limited enforcement capacity, and low awareness of occupational risks. The devolution of fisheries management envisioned by Malawi's National Decentralization Policy (1998) and the Fisheries Conservation and Management Act (1997) has not translated into meaningful improvements in occupational health, as neither local governments nor District Fisheries Offices have the technical or logistical resources to integrate health and safety within their mandates (Government of the Republic of Malawi, 2022; Kachilonda et al., 2024). This results in fragmented accountability, where fishers' health remains peripheral to policy discussions dominated by resource conservation and economic output.

Recent research by Kalumbi et al. (2020) in fishing communities around Lake Malombe illustrates how environmental health and occupational well-being are interlinked. The study found that over 70 percent of households relied on unsafe water sources and fewer than 25 percent had functioning handwashing facilities. Such conditions amplify risks of diarrheal diseases, cholera, and schistosomiasis—illnesses that diminish fishers' physical capacity to work and undermine household livelihoods. Poor sanitation infrastructure and the transient nature of fishing settlements further exacerbate exposure to infectious disease, while inadequate waste management near landing sites poses both environmental and occupational hazards. The absence of safe water and basic hygiene thus constitutes a critical occupational health deficit within the fisheries sector, with implications for productivity and long-term sustainability.

Within this fragile context, BVCs and other local governance entities act as de facto health intermediaries, coordinating responses to outbreaks and disseminating information through informal networks. However, their participatory legitimacy is undermined by resource scarcity and weak coordination with district health offices. These shortcomings mirror findings from the USAID Mikajy Activity in Madagascar, where community-based natural resource management (CBNRM) initiatives achieved sustainability only when linked to broader institutional support, including access to health services and financial inclusion (USAID, 2020). Similar integrated approaches could enhance Malawi's fisheries governance by embedding occupational health within co-management structures and aligning fisheries, water, and health policies.

Interactive Governance (IG) theory helps clarify this dynamic: Malawi's system demonstrates high participatory diversity but low resource enablement. Interaction among actors—fishers, BVCs, district councils, and NGOs—is robust but insufficiently supported by financial and institutional infrastructure. While PFM and decentralization have opened deliberative spaces, they lack the reflexive mechanisms needed to translate local experience into policy reform. Moreover, as Kalumbi et al. (2020) emphasize, health vulnerabilities are not merely outcomes of poverty but products of governance neglect, manifested in the exclusion of marginalized fishing communities from national Water, Sanitation & Hygiene (WASH), and occupational health programs. Addressing these governance asymmetries requires capacity building, multi-sectoral integration, and reflexive learning mechanisms. Practical measures could include developing cross-sector partnerships between fisheries authorities, the Ministry of Health, and local governments to establish mobile occupational health services targeting lakeshore areas. Such initiatives would mirror the success of decentralized health insurance and mobile clinic models piloted in community-based conservation contexts elsewhere in sub-Saharan Africa (USAID, 2020). Additionally, formalizing BVCs' mandates to include occupational health monitoring—supported by technical training, early warning systems, and modest funding allocations—could strengthen resilience and enhance the governability of health outcomes.

Ultimately, Malawi's participatory fisheries governance illustrates the paradox of empowerment under constraint: community engagement thrives at the local level, but the absence of vertical integration and material support curtails its transformative potential. As the IG framework underscores, governability depends not merely on participation but on the alignment between interaction, structure, and reflexivity. In Malawi, advancing fishers' occupational health and well-being thus demands moving beyond participation toward a governance system capable of learning, adapting, and resourcing itself to meet the realities of small-scale fisheries.

International and Cross-Scale Governance Dynamics

The interactive governance framework provides analytical clarity on how occupational health outcomes emerge from the interplay of multiple governing systems—public, private, and civil society. International instruments such as the FAO/ILO/IMO Safety Recommendations for Decked Fishing Vessels Under 12 Meters and the International Labour Organization - Work in Fishing Convention No C188 (ILO, 2007) form the normative basis for national implementation. Yet, as emphasized in IFISH 6 proceedings, most small-scale fishers remain disconnected from these frameworks due to limited state capacity, weak data systems, and absent enforcement (Lincoln, 2024; FAO Secretariat, 2024). The governance challenge, therefore, is not merely regulatory adoption but translation into accessible, context-relevant practices.

Within Norway, translation occurs through institutional integration—occupational health services, union representation, and welfare schemes. In Malawi, it must occur through adaptive local governance, leveraging BVCs as entry points for awareness, training, and community-based safety initiatives. These variations along the Malawi–Norway spectrum underscore the need for multi-scalar collaboration that aligns international standards with community realities, guided by Interactive Governance Theory's principle of co-evolution between system capacity and problem complexity (Kooiman & Bavinck, 2013; Jentoft & Chuenpagdee, 2015).

Limitations and Governance Challenges

Despite progress, both ends of the spectrum reveal enduring limitations. In Norway, safety governance sometimes prioritizes compliance over innovation, and fragmented responsibilities

between fisheries and labor authorities hinder systemic prevention (Thorvaldsen et al., 2022). In Malawi, persistent under-resourcing and dependence on external aid reduce continuity and accountability. Globally, the absence of comprehensive data on fisher morbidity and mortality impedes evidence-based governance (Lincoln, 2024; FAO Secretariat, 2024). The Interactive Governance approach recognizes these limitations as symptoms of governability gaps—the mismatch between problem complexity and governance capacity. Closing these gaps requires integrating occupational health into fisheries policy, fostering cross-sectoral partnerships, and building participatory accountability mechanisms that empower fishers as co-governors of their own well-being.

The Governance Spectrum

Norway: A Resource-Enabling but Complex System

Norway's fisheries governance lies at the resource-enabling end of the occupational-health spectrum. Decades of institutional development have produced an elaborate regulatory architecture that integrates fisheries management, labor standards, and social welfare. The country's Working Environment Act, its ratification of the International Labour Organization (ILO) Work in Fishing Convention (C188), and its participation in European Economic Area (EEA) labor-safety frameworks collectively ensure comprehensive occupational-safety obligations (Nofima, 2021). These mechanisms, together with the Norwegian Fisheries Directorate's quota regulations, have contributed to environmental sustainability and economic stability. Yet, as Thorvaldsen et al. (2022) demonstrate, they have also produced unintended occupational pressures that affect fishers' well-being.

The management model relies on licensing systems, activity requirements, and complex quota allocations designed to promote sustainable harvests (Thorvaldsen, 2015). In practice, these instruments influence how and when small-scale fishers work. The so-called *"Olympic fishing"* effect—where open quotas drive intense short-term fishing before seasonal closures—creates conditions of time pressure, fatigue, and risk-taking (Thorvaldsen et al., 2022). Similarly, activity requirements linked to license retention can compel fishers with injuries or illness to continue fishing to maintain rights, demonstrating how governance for sustainability can inadvertently conflict with occupational safety. The interactive character of governance becomes evident here: rules designed for ecological balance simultaneously shape social and health outcomes.

From a social-sustainability perspective, Nofima's *Social Sustainability in Norwegian Fisheries* (2021) report observes that although Norway's fisheries rank highly in formal safety compliance, smaller vessels—particularly those under 11 meters—account for a disproportionate share of serious injuries and fatalities. The persistence of such disparities indicates that formal regulation alone does not guarantee safety; the alignment between governing institutions and day-to-day realities remains partial. Fragmentation between the Norwegian Labor Inspection Authority, the Fisheries Directorate, and municipal health services constrains cross-sector learning and reflexive policy adjustment.

Health and psychosocial support for fishers mirror the strengths and weaknesses of Norway's welfare model. Ruud and Friis (2021) describe the extensive network of Community Mental Health Centers (CMHCs), crisis-resolution teams, and outpatient services that operate under municipal and regional health trusts. These institutions offer high professional capacity but experience challenges of coordination and continuity. For fishers in dispersed coastal communities, distance to specialized care and limited adaptation of services to occupational schedules reduce accessibility. This administrative compartmentalization—where mental-

health care, occupational-safety oversight, and fisheries management operate within separate governance silos—weakens the system's overall reflexivity.

At the same time, Norway provides instructive examples of how institutional reflexivity could evolve. The Norwegian Veterinary Institute's fish-health monitoring system, which continuously tracks the welfare of farmed fish through coordinated surveillance and early-warning networks (Norwegian Veterinary Institute, 2025; Geminni.no, 2025), represents a good preventive-governance model. Translating this model to human health would mean establishing a dedicated Fishers' Health and Well-being Program under the Helsedirektoratet (Norwegian Directorate of Health). Such a program could collect longitudinal data on injuries, ergonomic strain, and mental-health trends among capture-fishery workers, feeding results back into policy design. Conceptually, this embodies the Interactive Governance ideal of co-evolving relationships between governing systems and the systems-to-be-governed. By turning information about fisher well-being into adaptive governance practice, Norway could move from compliance-based oversight toward a learning governance regime that sustains both human and ecological resilience.

Malawi: A Participatory but Resource-Constrained System

Malawi's fisheries sector is situated toward the participatory but resource-constrained end of the governance spectrum, with small-scale fishers (SSFs) in lakeshore communities operating amid pronounced material scarcity and institutional fragility. As established earlier, the foundations of Malawi's fisheries governance rest on Participatory Fisheries Management (PFM), in which Beach Village Committees (BVCs) act as locally representative co-management bodies. Building on that framework, the present discussion highlights how limited fiscal capacity, uneven decentralization, and weak vertical coordination continue to constrain the governability of occupational health outcomes. The National Decentralization Policy (1998) and Fisheries Conservation and Management Act (1997) devolved authority to district councils and community structures, yet fiscal transfers and technical support have not followed at commensurate levels (Kachilonda et al., 2024). District Fisheries Offices frequently lack the budgets, staff, and logistical means to provide consistent training or to monitor health and safety compliance. This has produced what Interactive Governance (IG) theory describes as a mismatch between interactional vitality and structural capacity: community institutions exist and engage actively, but the enabling environment required to sustain them remains underdeveloped. Consequently, the system's governability—its collective ability to align social interaction with institutional capability—remains low despite participatory breadth. These resource constraints extend into the broader healthcare delivery system, which, although officially decentralized, remain marked by pronounced inequalities. According to the World Health Organization (WHO, 2013) and empirical evidence from the Phalombe District (Ritter et al., 2022), large sections of the rural population lack access to functioning clinics, diagnostic services, and qualified personnel. The limited availability of drugs, diagnostic tools, and transport—exacerbated by blackouts and poor infrastructure—undermines both health service reliability and trust. Health providers often face excessive workloads and systemic shortages that lead to frustration, while community members perceive disrespect, long waiting times, and favoritism in care provision. Such dynamics reduce the *acceptability* of formal health services and discourage timely care-seeking, contributing to preventable illness and absenteeism among fishers. This erosion of trust and engagement mirrors a governance deficit: when health systems lack responsiveness, participation without empowerment becomes symbolic. Ritter et al. (2022) emphasize that sustainable improvement requires patient-centred and community-inclusive approaches, involving local populations in health facility management, awareness campaigns, and feedback mechanisms. These participatory mechanisms could be aligned with fisheries co-

management structures—such as embedding basic health monitoring, hygiene education, and first-aid capacity within BVC mandates—to strengthen occupational well-being.

These governance and health-system limitations are further intensified by environmental health conditions in lakeshore communities. Studies in lakeshore settlements (Kalumbi et al., 2020) reveal persistent deficits in water, sanitation, and hygiene infrastructure, which amplify exposure to diarrheal diseases, cholera, and schistosomiasis, conditions that directly impair fishers' productivity. Integrating WASH initiatives and health-service access into fisheries governance frameworks would thus enhance both ecological sustainability and human resilience.

Comparative experiences from the US>AID Mikajy Project (2020) in Madagascar show that participation yields durable outcomes only when accompanied by institutional reinforcement and cross-sectoral coordination. Similar integrated approaches in Malawi—linking the Ministry of Health, Fisheries Department, and Local Government Authorities—could establish mobile health clinics and training programs for lakeshore communities. This would operationalize the reflexivity principle central to IG theory, enabling systems to learn, adapt, and align resources with local realities.

In essence, Malawi's fisheries governance exhibits participatory legitimacy without material empowerment. Local actors are engaged in co-management, yet under-resourcing, low acceptability of health services, and limited coordination prevent participation from evolving into adaptive governance. Strengthening governability requires sustained investment in institutional capacity, communication training for health personnel, and inclusive feedback systems that connect community experience to national policy design. Through such alignment, Malawi can transform its participatory energy into durable governance capability—advancing both occupational health and the social sustainability of its small-scale fisheries.

Discussion

Interactive Governance (IG) theory illuminates how health and well-being outcomes in small-scale fisheries (SSF) emerge from the alignment—or misalignment—between system complexity, diversity, and adaptive capacity (Kooiman, 2003; Kooiman & Bavinck, 2013). Health in fisheries cannot be separated from the way ecological management, labor regulation, and welfare institutions interact. The evidence across the Malawi–Norway spectrum shows that governance structures profoundly shape the conditions under which fishers live and work. Both cases underscore that the capacity to govern occupational health depends not only on resources but also on reflexivity—the ability of governance systems to learn, adapt, and integrate feedback across scales.

Governability, Reflexivity, and the Health–Governance Nexus

In Norway, institutional density and specialization create a highly resource-enabled but complex system. Regulatory bodies such as the Norwegian Labour Inspection Authority, Fisheries Directorate, and Helsedirektoratet (Norwegian Directorate of Health) maintain clear legal standards yet operate largely within administrative silos. This segmentation promotes technical expertise but limits cross-sector dialogue and systemic learning (Thorvaldsen et al., 2022; Ruud & Friis, 2021). The outcome is high formal governability in ecological and economic domains but only moderate governability in the domain of fisher health. Occupational safety and psychosocial well-being remain secondary to resource management goals. As Nofima (2021) noted, social sustainability is often interpreted through compliance metrics

rather than through continuous feedback from workers themselves. Consequently, reflexivity—the capacity for adaptive learning—is constrained by bureaucratic compartmentalization.

To operationalize coordinated occupational-health programs in Norway, a plausible institutional home could be a cross-agency task force hosted by the Fisheries Directorate, linking Labour Inspection Authority data with occupational health units. Minimal data flows would include incident reporting, ergonomic and mental health indicators, and compliance checks, shared periodically through a centralized monitoring platform. Likely barriers include overlapping mandates, coordination costs, data-sharing constraints, and the need for dedicated funding streams to support integrated monitoring and preventive outreach.

Malawi represents the converse pattern: broad participatory diversity coupled with limited enabling resources. The Beach Village Committees (BVCs) foster horizontal legitimacy and community interaction, yet these participatory strengths seldom translate into structured occupational-health improvements (Kalumbi et al., 2020; Holm et al., 2021; Lincoln, 2024). Fishers' mobility, inadequate safety equipment, and minimal health-service coverage weaken institutional continuity. Governance here is flexible and contextually responsive but lacks the vertical linkages necessary for policy learning at a national scale. The Malawi Occupational Health and Safety Profile (ILO, 2013; Mbewe, 2009) does not even mention fishers as a working sector for inclusion in plans for implementing or improving occupational health and safety in the country. This omission highlights a critical gap in the recognition of fishers' occupational risks and the need for targeted interventions to address their unique vulnerabilities. Interactive Governance theory interprets this as a governability imbalance—a situation where diversity and engagement exist without corresponding institutional capacity to absorb and act on local knowledge (Jentoft & Chuenpagdee, 2015).

Practical, low-cost mechanisms could strengthen Malawi's co-governance structures. These include modular safety training for BVC members, simple mobile-based reporting tools for accidents and near misses, micro-insurance schemes linked to basic health services, and periodic mobile health outreach. Such interventions build on existing community institutions and social capital, improving occupational-health governance without presupposing high administrative or fiscal capacity.

Reflexivity emerges as the pivotal attribute determining whether governance diversity or complexity becomes an asset or a liability. In Norway, rigid institutional hierarchies slow responses to emergent occupational risks such as mental health stressors, ergonomic injuries, and fatigue linked to quota pressure (Thorvaldsen et al., 2022). In Malawi, informality allows rapid adaptation to seasonal and social dynamics but offers few mechanisms for consolidating learning or scaling effective practices. Bridging these extremes requires hybrid governance arrangements that combine participatory learning with institutional support, data infrastructure, and resource mobilization. Initiatives such as the European Parliament–endorsed SAFEFISHING project demonstrate how safety culture can be institutionalized through modular training, participatory risk prevention, and collaborative monitoring aligned with international standards such as the STCW-F Convention (Voces – European Parliament, 2017).

Occupational health initiatives such as SAFEFISHING are most transferable to SSF settings when certain conditions are met: training costs must be low, materials adapted to local languages and literacy levels, and delivery mechanisms able to function with limited enforcement capacity. Strong fisher organisations or community-based structures are essential for legitimacy and uptake, particularly where formal inspection regimes are weak. Elements

most readily adaptable include risk-awareness training, peer-based safety culture, and simplified reporting tools, while less transferable components include costly certification schemes, continuous digital monitoring, and compliance-intensive enforcement. In resource-constrained contexts such as Malawi, these frameworks are therefore best applied selectively—focusing on participatory risk prevention and incremental standard-setting—whereas Norway's institutional capacity allows closer alignment with formal certification and monitoring systems.

Health professionals are crucial intermediaries in this process. In Norway, Community Mental Health Centers (CMHCs) and occupational-health units provide preventive outreach and crisis support but have limited coordination with fisheries management or labor inspectors (Ruud & Friis, 2021). In Malawi, mobile clinics and BVC-linked partnerships could perform analogous bridging roles, translating community experience into public-health data and policy input. These cross-sector interactions exemplify IG's central insight: effective governance arises from the interplay of multiple systems rather than from any single institutional domain.

At a conceptual level, the health–governance nexus illustrates that occupational health in fisheries is co-produced by ecological regulation, market structure, and welfare policy. Environmental measures such as quota management shape work intensity and fatigue; licensing regimes influence risk behavior; and welfare access conditions recovery and resilience. A reflexive governance regime would integrate these domains through iterative feedback, enabling policymakers to trace how sustainability decisions cascade into health outcomes. In both Norway and Malawi, strengthening such feedback loops represents a critical frontier for occupational-health governance.

The Value of Interactive Governance for Health Policy

Interactive Governance reframes occupational-health policy from a sector-specific concern to a systemic one. Rather than treating fisher health as an add-on responsibility of health or labour authorities, IG situates it within a multidimensional governance network that regulates people, resources, and ecosystems. This systems perspective broadens policy accountability and enables integrative solutions that link environmental sustainability with human well-being (Kooiman et al., 2005; Jentoft & Chuenpagdee, 2015).

The contrasting experiences of Norway and Malawi demonstrate that over-complexity and under-capacity can produce similar governance deficits by eroding reflexivity. Embedding health monitoring and participatory learning within fisheries governance—through coordinated national programs in Norway or strengthened BVC-based safety networks in Malawi—can enhance system adaptability. IG theory thus offers not only analytical insight but also normative guidance: advocating governance designs that are inclusive, learning-oriented, and integrated across institutional levels.

Limitations, Strengths, and Future Directions

This article's synthesis is based primarily on secondary literature and policy analysis rather than new field data. As such, it does not claim empirical generalization. Nonetheless, it offers several strengths. First, it bridges environmental-governance theory and occupational-health scholarship—fields often treated separately—through the unifying framework of Interactive Governance. Second, by situating Malawi and Norway along a governance spectrum rather than as direct comparators, the study avoids the reductionism typical of North–South analyses. Third, it operationalizes the concept of governability for human-well-being outcomes, providing a transferable analytical model for future cross-sector research.

The limitations lie in scope and data depth. Secondary sources restrict the ability to capture lived experience, gendered differences, and intra-community variations in risk perception. Future research should employ participatory ethnography, occupational-health surveillance, and longitudinal mixed methods to explore how governance evolution influences physical and psychological health outcomes over time. Comparative case studies across additional contexts—such as Southeast Asia or the South Pacific—would test the applicability of the IG framework beyond the Malawi–Norway spectrum.

Finally, future inquiry should investigate reflexivity mechanisms: how information generated by health practitioners, unions, and fishers' associations feeds back into policymaking. Establishing iterative data loops and cross-sectoral learning platforms could transform occupational-health governance from reactive compliance toward proactive co-management. In this sense, the article's theoretical contribution lies not only in diagnosing governability gaps but also in proposing a reflexive, multi-scalar approach that links human health, governance capacity, and environmental sustainability as co-evolving dimensions of resilient fisheries systems.

Conclusions and Policy Insights

Occupational health and well-being in small-scale fisheries should be understood not as peripheral labor management issues but as integrative signals of how governance systems operate and adapt. By applying Interactive Governance (IG) theory, this article offers a governance-based interpretation of how health outcomes are shaped by the interaction between institutional structures, actor engagement, and learning capacity across sectors and scales. The analysis does not claim causal attribution but instead advances a conceptual lens through which occupational health can be read as an indicator of governability.

Positioning Norway and Malawi as illustrative poles along a governance spectrum highlights how different configurations of capacity and participation generate distinct but related challenges. In Norway, a resource-enabling governance regime provides strong regulation, technical competence, and welfare provision, yet institutional fragmentation and limited cross-sector reflexivity constrain integrated responses to occupational health risks (Thorvaldsen et al., 2022; Ruud & Friis, 2021; Thorvaldsen, 2017). Recent policy initiatives, such as the *Nasjonal handlingsplan for nullvisjonen* led by the Norwegian Maritime Authority, acknowledge these coordination challenges and point toward the need for more systemic approaches to safety and health governance (Sjøfartsdirektoratet, 2024). In contrast, Malawi's fisheries governance—anchored in Beach Village Committees—demonstrates strong participatory legitimacy and local engagement but remains constrained by limited material resources and weak vertical policy linkages, which restrict the translation of participation into sustained occupational-health improvements (Holm et al., 2021; Ritter et al., 2022; Lincoln, 2024).

Taken together, these configurations illustrate a central insight from IG theory: governance capacity must be commensurate with problem complexity. Systems characterized by high expertise but weak integration, and those rich in participation but poor in enabling resources, both face governability constraints. From an IG perspective, improving occupational-health governance is therefore less about replicating institutional models and more about fostering hybrid arrangements that combine institutional support with participatory learning and reflexive coordination. Occupational health and well-being governance emerges as a co-evolutionary process rather than a fixed policy outcome.

From this synthesis, several policy-relevant insights follow.

(a) First, cross-sector coordination among fisheries authorities, labor regulators, and public health institutions needs to be institutionalized rather than relying on ad hoc collaboration. Embedding occupational health and well-being within fisheries governance frameworks can help ensure that safety, mental health, and social protection are treated as integral dimensions of sustainability rather than external add-ons.
(b) Second, context-sensitive service delivery mechanisms emerge as a critical area for policy learning. In Norway, this could involve exploring a coordinated Fishers' Health and Well-being Programme under the Norwegian Directorate of Health (Helsedirektoratet), building on existing preventive surveillance models used in aquaculture but adapted to capture human health outcomes. In Malawi, incremental strengthening of BVC-linked mobile and community-based health services—through basic occupational-safety training, first-aid capacity, and outreach aligned with fishers' work patterns—represents a feasible governance pathway that builds on existing participatory structures without presupposing high administrative or fiscal capacity.
(c) Third, integrating occupational-health indicators into fisheries policy evaluation could support more reflexive governance. Monitoring fishers' physical and psychosocial well-being alongside ecological and economic metrics would enable policymakers to better understand the social implications of management decisions and adjust governance arrangements accordingly.
(d) Finally, participatory monitoring and learning should be supported as governance functions in their own right. Strengthening the capacity of cooperatives, community organisations, and unions to document and communicate health risks can help create feedback loops that connect lived experience with institutional decision-making—an essential condition for reflexivity in complex governance systems.

In conclusion, this article advances a governance-oriented interpretation of occupational health in small-scale fisheries, positioning health and well-being as lenses through which governability can be examined and debated rather than as outcomes to be explained causally. Interactive Governance does not offer prescriptive solutions; instead, it provides a framework for policy learning that foregrounds integration, reflexivity, and shared responsibility across institutions and scales. In this view, the health of small-scale fishers reflects the broader governance capacity of society—its ability to align care, sustainability, and justice within complex social–ecological systems. By treating occupational health and well-being as an intrinsic dimension of fisheries governance, policymakers and researchers can move beyond sectoral fragmentation and toward governance arrangements that are more coherent, humane, and resilient, sustaining both ecosystems and the people whose labor underpins them.

Ethical approval
Not applicable as no humans or animals were involving in this study.

Informed consent
Not available as single author is present in this study.

Data availability statement
The author declares that data can be provided by corresponding author upon reasonable request.

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There is no conflict of interests for publishing the study. The corresponding author is responsible for declaration.

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References

Food and Agriculture Organization (FAO). (2022). Report of the thirty-fifth session of the Committee on Fisheries (COFI). Rome: FAO. Retrieved October 31, 2025, from https://openknowledge.fao.org/server/api/core/bitstreams/cc383ab3-5c1d-4d1c-88dc-066c7243d982/content

FAO Secretariat. (2024). Safety and working conditions in the fisheries sector: Legal and policy avenues for strengthened decent work standards in the fisheries sector (Joint FAO/ILO/IMO Ad Hoc Working Group on Illegal, Unreported and Unregulated Fishing and Related Matters, 5th session, JWG 5/INF.7). Retrieved November 5, 2025, from https://openknowledge.fao.org/server/api/core/bitstreams/12375e0e-abf2-493e-87fa-55d85201d526/content

Geminni.no (2025) av Brandslet, S., 2025, August 15. Fiskebæsj kan fortelle om laksen har det bra. *Geminni*. Retrieved 31 October 2025 from https://gemini.no/2025/08/avforingen-kan-fortelle-om-laksen-har-det-bra/

Government of the Republic of Malawi. (2022). Health Sector Strategic Plan III 2023–2030: Reforming for universal health coverage (First Edition). Ministry of Health, Government of Malawi. Retrieved October, 25, 2025, from https://faolex.fao.org/docs/pdf/mlw220703.pdf

Helsedirektoratet. (2021). Sektorrapport om folkehelse 2021. Helsedirektoratet. Retrieved October, 28, 2025 from https://www.helsedirektoratet.no/rapporter/sektorrapport-om-folkehelse

Holm, R. H., Chakalamba, T., Ngasama, B., & Kapute, F. (2021). Geographic and occupational mobility of small-scale fishers of Lake Malawi: An exploratory study of water, sanitation, and hygiene access, Malawi. *Water Policy, 23*(1). https://doi.org/10.2166/wp.2021.058

Holmen, I. M., Thorvaldsen, T., Salomonsen, C., & Sønvisen, S. A. (2025). Safety and accidents in fishing: A study of causes and risk factors in the Norwegian fishing fleet. *Journal of Agromedicine, 30*(2), 306–318. https://doi.org/10.1080/1059924X.2025.2462300

International Labour Organization [ILO]. (1999). Sectoral Activities Programme. Safety and health in the fishing industry: Report for discussion at the Tripartite Meeting on Safety and Health in the Fishing Industry, Geneva, 1999. Retrieved October, 5, 2025, from http://www.ilo.org/public/libdoc/ilo/1999/99B09_239_engl.pdf

International Labour Organization [ILO]. (2007). C188 - Work in Fishing Convention (No. 188). Geneva: ILO. Retrieved November 4, 2025, from https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312333

International Labour Organization [ILO]. (2013, September 19). Malawi National Occupational Safety and Health Programme 2011–2016: Moving towards zero accidents and diseases at work. Retrieved November 5, 2025, from https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_protect/%40protrav/%40safework/documents/policy/wcms_221740.pdf

Jentoft, S., & Chuenpagdee, R. (2015). Interactive governance for small-scale fisheries: Global reflections (Vol. 13). Springer. https://doi.org/10.1007/978-3-319-17034-3

Kachilonda, D., Tuda, P., Jamu, D., & Torell, E. (2024). Devolution of fisheries management in the four Malawi water bodies. Retrieved October 29, 2025, from https://tinyurl.com/3236wc9c

Kalumbi, L. R., Thaulo, C. V., Morse, T. D., & MacPherson, E. E. (2020). Perspectives and practices on water, sanitation, and hygiene from a fishing community along Lake Malombe, Southern Malawi. *International Journal of Environmental Research and Public Health, 17*(18), 6703. https://doi.org/10.3390/ijerph17186703

King, T. J., Turner, R., Versace, V., Abernethy, K., Kilpatrick, S., & Brumby, S. (2021). Mental health in the commercial fishing industry: Modern uncertainties and traditional risks. *Fish and Fisheries*. https://doi.org/10.1111/faf.12572

Kooiman, J. (2003). Governing as governance. SAGE Publications Ltd. https://doi.org/10.4135/9781446215012

Kooiman, J., & Bavinck, M. (2005). The governance perspective. In J. Kooiman, M. Bavinck, S. Jentoft, & R. Pullin (Eds.), Fish for life: Interactive governance for fisheries (pp. 11–24). Amsterdam University Press. https://library.oapen.org/bitstream/handle/20.500.12657/35130/340216.pdf

Kooiman, J., Bavinck, M., Jentoft, S., & Pullin, R. (2005). Fish for life: Interactive governance for fisheries (1st ed., Vol. 3). Amsterdam University Press. Amsterdam. ISBN 9053566864

Kooiman, J., & Bavinck, M. (2013). Theorizing governability – The interactive governance perspective. In M. Bavinck, R. Chuenpagdee, S. Jentoft, & J. Kooiman (Eds.), Governability of fisheries and aquaculture: Theory and applications (pp. 9–30). Springer. https://doi.org/10.1007/978-94-007-6107-0_2

Lincoln, J., Sorensen, J., Elliott, K. C., & Poulain, F. (Eds.). (2024). Proceedings of the Sixth International Fishing Industry Safety and Health Conference (IFISH 6), 8–12 January 2024, Rome, Italy. FAO. https://doi.org/10.4060/cd0972en. Retrieved October 31, 2025, from https://www.unn.no/49dee4/contentassets/188e90a0b93a4c5693863136c4dd57a3/proceedings-ifish6.pdf

Mbewe, B. (2009). Malawi occupational health and safety profile. International Labour Organization (ILO). Retrieved November 5, 2025, from https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_protect/@protrav/@safework/documents/policy/wcms_187633.pdf

McGuinness, E., Aasjord, H. L., Utne, I. B., & Holmen, I. M. (2013). Injuries in the commercial fishing fleet of Norway 2000–2011. *Safety Science, 57*, 82–99. https://doi.org/10.1016/j.ssci.2013.01.008

Ngaruiya, F. W., Ogendi, G. M., & Mokua, M. A. (2019). Occupational health risks and hazards among the fisherfolk in Kampi Samaki, Lake Baringo, Kenya. *Environmental Health Insights, 13*, 1–11. https://doi.org/10.1177/1178630219881463

Nofima. (2021). Requirements for social sustainability in the Norwegian fisheries industry (SocSus Project Report). Tromsø: Nofima. Retrieved November 4, 2025, from https://nofima.no/wp-content/uploads/2021/05/Social-sustainability_lr.pdf

Norwegian Veterinary Institute. (2025). Norwegian Fish Health Report 2024 (Report No. 1b/2025). Norwegian Veterinary Institute. Retrieved October 4, 2025, from https://www.vetinst.no/rapporter-og-publikasjoner/rapporter/2025/norwegian-fish-health-report-2024

Øren, A., Thorvaldsen, T., Sandsund, M., & Holmen, I. M. (2019). Sickness absence and hospitalization among workers on board Norwegian fishing vessels. *Journal of Agromedicine, 24*(4), 357–363. https://doi.org/10.1080/1059924X.2019.1640150

Ritter, R., Nkhwalingwa, N., Anthonj, C., & Kistemann, T. (2022). Coping with ill-health while lacking access to health care: Acceptability of health service provision in rural Malawi – A qualitative study. *Global Health Action, 15*, 2062174. https://doi.org/10.1080/16549716.2022.2062174

Roberts, S. E. (2010). Britain's most hazardous occupation: Commercial fishing. *Accident Analysis & Prevention, 42*(1), 44–49. https://doi.org/10.1016/j.aap.2009.06.031

Ruud, T., & Friis, S. (2021). Community-based mental health services in Norway. *Consortium Psychiatricum, 2*(1), 47. https://doi.org/10.17816/CP43

Sandsund, M., Øren, A., Thorvaldsen, T., Holmen, I., Sønvisen, S., Heidelberg, C. T., & Aasmoe, L. (2019). Musculoskeletal symptoms among workers in the commercial fishing fleet of Norway. *International Maritime Health, 70*(2), 100–106. https://doi.org/10.5603/IMH.2019.0016

Sjøfartsdirektoratet. (2024, December 17). Nasjonal handlingsplan for sjøsikkerhet (Version 1.0). Nasjonal-handlingsplan-for-nullvisjonen på sjøen - Sjøfartsdirektoratet. Retrieved November 8, 2025, from https://www.sdir.no/contentassets/d5e5695353fc43acaa91b6b7878a930d/nasjonal-handlingsplan-for-sjosikkerhet-bruk.pdf

Thorvaldsen, T. (2015). Managing risk in the Norwegian fishing fleet. *Policy and Practice in Health and Safety, 13*(1). https://doi.org/10.1080/14774003.2015.11667809

Thorvaldsen, T. (2017). Fra frie menn til trygge arbeidere: En antropologisk studie av sikkerhet, regulering og yrkesfiskeres arbeidspraksis (Doctoral dissertation, NTNU). NTNU Grafisk senter. Retrieved November 8, 2025, from https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2484996

Thorvaldsen, T., Sønvisen, S. A., & Holmen, I. M. (2022). The impact of fisheries management on fishers' health and safety: A case study from Norway. *Marine Policy, 140*, 105066. https://doi.org/10.1016/j.marpol.2022.105066

USAID Mikajy Activity. (2020). Annual performance report. Retrieved October 29, 2025, from https://www.boost-ae.net/medias/61806941-5d63-471d-feb8-f19542343c06.pdf

Utete, B. (2023). Mental *health* in fishing communities: An overview of current knowledge and information gaps for fisheries. *Qeios*. https://doi.org/10.32388/9F2WMH

Voces, D., & Spera, L. (2017). Fishers' health and safety centre stage in the European Parliament. Europeche. Retrieved October, 28, 2025, from https://europeche.chil.me/attachment/7417f33d-e98d-459e-b7a1-d052e06fc574

Voces (2017) - European Parliament. (2017). EU fishing sector presents a training tool for risk prevention and safety at sea (EP(17)51). Association of National Organisations of Fishing Enterprises in the EU. Retrieved October, 30, 2025, from https://europeche.chil.me/attachment/cc39b6d1-2a60-4ce5-92c9-c1e38fd5ba6b

Woodhead, A. J., Abernethy, K. E., Szaboova, L., & Turner, R. A. (2018). Health in fishing communities: A global perspective. *Fish and Fisheries, 19*, 839–852. https://doi.org/10.1111/faf.12295

World Health Organization (WHO). (2013). The world health report 2013: Research for universal health coverage. WHO. Retrieved 31 October 2025, from https://iris.who.int/server/api/core/bitstreams/5079df2c-76a0-4a38-a0a4-3c44845f5cb5/content